WHAT IS CLAIMED IS:

1. An apparatus for winding an optical fiber in the form of a quadrupole for forming a sensor coil of a fiber optic gyroscope, comprising:

a center shaft supported by a pair of support members;

a cylindrical spool fitted around the center shaft;

a pair of winding disks arranged adjacent to both ends of the spool in such a manner that they can be rotated about the center shaft; and

a pair of reels detachably mounted to facing surfaces of the winding disks, both halves of the optical fiber to be wound on the spool being wound on the reels, respectively;

wherein the winding disks can be rotated with respect to the spool at the same velocity in opposite directions, the cylindrical spool is installed to be reciprocated along an axis of the center shaft, and the respective reels mounted to the winding disks are spaced apart from each other by a predetermined interval.

2. The apparatus as set forth in claim 1, wherein a pair of inclined projections is formed at both ends of the spool, respectively, to delimit a winding range of the optical fiber.

3. The apparatus as set forth in claim 1, wherein a pair

of balancing members are secured to the facing surfaces of the winding disks so that the balancing members are positioned opposite to the reels, respectively, around the center shaft.

4. The apparatus as set forth in claim 1, wherein driving mechanisms for rotating the winding disks are provided in the support members.

5. A method for winding an optical fiber in the form of a quadrupole for forming a sensor coil of a fiber optic gyroscope, comprising the steps of:

(a) winding both halves of the optical fiber on first and second reels which are mounted to first and second winding disks, respectively;

(b) setting the optical fiber extending from the respective reels on a spool which is positioned between the first and second winding disks;

(c) aligning the first reel with one end of the spool and the second reel outward of said one end of the spool, and rotating in a first direction the first winding disk to which the first reel is mounted, so that the optical fiber wound on the first reel is started to be wound on the spool toward a middle part of the spool to form a first winding layer;

(d) when the second reel is aligned with one end of the spool, rotating the second winding disk to which the second

reel is mounted in a second direction opposite to the first direction so that a second winding layer is simultaneously formed on the first winding layer;

(e) when the first winding layer formed by the first winding disk reaches the other end of the spool, interrupting the rotation of the first winding disk, and continuously rotating the second winding disk until the second winding layer reaches the other end of the spool to complete formation of the first and second winding layers; and

(f) repeating the steps (c) through (e) in a reverse order to simultaneously form third and fourth winding layers on the first and second winding layers.

6. The method as set forth in claim 5, wherein a pair of inclined projections is formed at both ends of the spool, respectively and another winding layer is started to be formed in an opposite direction when a winding layer reaches any one of the inclined projections.

7. The method as set forth in claim 5, wherein rotation of the first and second winding disks is automatically controlled depending upon positions of the spool and winding layers which are detected by sensors.